## THE COMPLETE BOTANY-TEACHER.

*The Teaching Botanist. A Manual of Information upon Botanical Instruction, including Outlines and Directions for a Synthetic General Course.* By Prof. W. F. Ganong. Second edition, revised. Pp. xi+439. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1910.) Price 5*s*. net.

THE first edition of Prof. Ganong's book received a welcome on this side the Atlantic such as is accorded to few elementary botanical works produced in America, and it has proved of the greatest value to many engaged in the teaching of elementary botany, or in training as future teachers of the subject. The second edition, lately published, has been thoroughly revised, and, indeed, re-written almost throughout, besides being considerably enlarged, though the general plan, and, above all, the animating spirit of the book, not to mention the very moderate price, remain unchanged. To all intents and purposes this edition is a new work, and should be in the hands of all botanical teachers, both *in esse* and *in posse*, whether or not they already possess the first edition.

In part i., occupying, roughly, half of the book, the author deals in a practical, yet philosophic and stimulating, manner with the place of the sciences in education and of botany among the sciences, followed by a thoughtful and vigorous discussion of the pertinent question, "What botany is most worth?" and proceeds to the consideration of the training of the good botanical teacher, the methods of good botanical teaching, botanical drawings and descriptions, the equipment of laboratories, and the arrangement of collections. A valuable chapter follows on botanical books and their use, with a bibliography—by no means exclusively American—which, with a few deletions, would serve as the catalogue of an ideal library for any institution in which the subject is taught. One is inclined to wonder when there will be found an author—and publisher—courageous enough to publish a "black list" of undesirable books on botany and nature-study generally; but, after all, this would merely postpone for a time the oblivion into which bad books are bound to sink sooner or later.

As is well known, Prof. Ganong has shown himself, especially in his valuable "Plant Physiology," to be an acute critic of many erroneous facts and ideas, and of faulty methods of experimentation, which are only too common in botanical literature, not only in books of the baser sort, but even in standard and authoritative works. In the present work he ends part i. with a breezy and delightful chapter—only too short—on some common errors prejudicial to good botanical teaching, which will bring some discomfort to conscientious teachers, while pointing out to them the better way. Such teachers will, however, be to some extent consoled by the author's candid confession that he, too, has occasionally perpetuated, and even originated, ideas and phrases which are "unfortunate if not erroneous." This chapter is certainly deserving of most careful study by all teaching botanists.

In part ii. Prof. Ganong outlines a general course in elementary botany—not a mere skeleton or series of headings, but a thoroughly practical, fairly detailed, and altogether excellent syllabus of instructions for the carrying out of a very full year's work in the morphology and physiology of plants. It would be difficult to devise a better guide to the elements of botany for those who may go no farther with the subject, or a more suitable first-year course for those who intend to proceed to more advanced work in botany. This admirable and wisely designed course of instruction may be warmly commended, not only to teachers of botany, but to those who are responsible for the drafting of examination syllabuses in the subject in this country. F. C.

## CLIMATIC CONDITIONS AND ORGANIC EVOLUTION.

*Die klimatischen Verhältnisse der geologischen Vorzeit vom Praecambrium an bis zur Jetztzeit und ihr Einfluss auf die Entwickelung der Haupttypen des Tier- und Pflanzenreiches.* By Dr. Emil Carthaus. Pp. v+256. (Berlin: R. Friedländer und Sohn, 1910.) Price 8 marks.

THIS treatise commences with a consideration of the views of different authors upon the early evolution of the earth. Of the rocks in the earth's crust, Olivine rock (Dunite) is considered by the author to be the most primitive, its formation having taken place before the condensation of the water-vapour contained in the very earliest atmosphere. The gneisses, however, were formed after such condensation had occurred. The beginnings of organic life were present in the original atmosphere of water-vapour, but the author doubts the view of Arrhenius that the early spores could have reached the earth from other heavenly bodies. The period between the Upper Cambrian and Purbeckian was one of little rain, the existence of salt deposits in the early formations at various places widely separated from one another, and the complete absence of real freshwater calcareous deposits prior to the Jurassic being cited as evidence in support of that view. In this connection the interesting questions are propounded: Why have no remains older than the fauna of late Tertiary or diluvial times been found in the caves of Devonian, Carboniferous, Triassic, and Jurassic limestones? Why did cave formation thus probably begin first in Tertiary times?

The occurrence of forests of Rhizophora (Dicotyledons) in the sea of the Malay Archipelago is instanced as a reason against the assumption of the necessarily freshwater origin of the Ferns, Sigillaria, Lepidodendron, Equisetites, Conifers, and Cycads of the older geological formations. Great stress is laid upon the difference in the movements of the sea-water as affecting the forms of life at different times. The increase of these movements in later geological periods tended to destroy the brachiopods, the bilateral symmetry of the Tetracoralla gave way to the radial symmetry of the Hexacoralla, while the later Echinoidea, as compared with the earlier, underwent

changes in the number and arrangement of plates; the increasing complication of the ammonite sutures is explained on the same ground. It is pointed out that the multiplication in number of the sinupalliate Lamellibranchiata in Cretaceous time and their further acceleration in company with the Heterodont forms in the Tertiary period correspond with the incoming and continuance of freshwater conditions. In recent times certain Lamellibranch species in the Black Sea and Caspian Sea have wandered into brackish and fresh water, and as a result there is an increase in length of the siphon, a gaping of the shell, and the formation of a mantle-sinus.

The work has been written in the seclusion of an Indian hotel without the immediate advantages of close contact with the scientific world and its literature. This explains to a great extent the semi-popular nature of the book, and accounts, perhaps, for the omission of a bibliography other than rare and general references in the text. A division into chapters and the inclusion of a more extensive index would have been a decided improvement. Although controversial in many of its statements, the contribution has the undoubted merit of arousing interest and thought. The author appears to be a strong believer in the inheritance of acquired characteristics, and is not inclined to the assumption of an indwelling tendency towards perfection in forms of life; the followers of Cope, von Baer, Naegeli, and von Eimer would, therefore, find much material for debate. The statement that land or fresh-water animals and plants older than of Tertiary age are not found in the earth clefts of primary and secondary formations is certainly erroneous. For instance, the teeth of Microlestes found by Charles Moore and submitted to Owen in 1858 came from a Rhaetic breccia filling a fissure in the mountain Limestone, near Frome, Somersetshire.

IVOR THOMAS.

## *COMMERCIAL ORGANIC ANALYSIS.*

*Allen's Commercial Organic Analysis.* Edited by Prof. H. Leffmann and W. A. Davis. Vol. II., Fixed Oils, Fats and Waxes, Soap, Glycerol, Cholesterols, &c. Fourth edition, entirely rewritten. Pp. x+520. (London: J. and A. Churchill, 1910.) Price 21s. net.

MOST analysts are aware that a fourth edition of Allen's well-known work is in course of preparation. Two of the eight volumes composing the edition have now appeared, and a notice of Vol. I. will be found in NATURE of June 16 last. Two more are announced for publication this year, and the remaining four are promised without undue delay. The plan of having both an American and an English editor has been adopted, and articles are contributed by writers from each side of the Atlantic. This seems a sensible arrangement, as with comparatively little modification the book is made to serve the needs of chemists in both countries.

The volume now under review is much extended and improved as compared with its predecessor of the last edition. Mr. C. A. Mitchell is responsible for the opening section describing the general properties of the fixed oils and fats, as well as the common processes of analysis, whilst the special characters of the individual products, and the particular methods of examining them, are discussed by Mr. L. Archbutt. Having regard to the scope of the book, both sections appear to be very well done. As much trustworthy information as could well be given in the space allotted will be found in these two sections, and no point of importance calling for adverse remark has been noticed by the present writer in looking through a number of representative pages. Perhaps the articles on arachis oil, olive oil, and the beeswax group may be singled out as good examples of compressed essentials. Sometimes, indeed, the compression is a trifle too marked. Many references, however, are given to original papers, so that fuller details can often be obtained.

Certain products, including butter, soap, and glycerol, are each given a special section. Messrs. Revis and Bolton have taken charge of the chapter on butter fat. They have studied their subject well, and, among other things, have grasped a fact which seems to have puzzled some experts on butter analysis —namely, that the addition of lard to butter may produce a distinct (apparent) increase of the "Polenske figure," which might be taken by the unwary as indicating the presence of cocoanut oil. One or two small errors have crept in; thus the Zeiss values in the first table on p. 290 are wrongly given as being taken at 40° C. instead of 45°, and there are two misprints in the second table on the same page. A favourable opinion, based upon the authors' own experiments, is expressed in reference to Lallemant's "barium saponification" method of examining butter fat. How far the commendation is deserved cannot be judged from the particulars given. For example, granted that the method detects cocoanut oil in butter, it may yet be that the detection could be made just as certainly and much more readily by older processes. The really difficult problem is the recognition of lard or beef-fat when present in butter, and it is in the promise of this that the chief importance of Lallemant's process lies. It will be interesting to see how it stands the test of experience when applied, on a sufficiently extended scale, to genuine butter having Reichert-Wollny values in the region of 23 and 24.

Of Prof. Leffmann's chapter on soaps and the other special contributions it must suffice to note that they contain all that an analyst will generally require to know on the subjects. They help to make the volume a distinct improvement upon the former editions.

C. S.

## *THE SEVEN LAMPS OF BIOLOGY.*

*Das System der Biologie in Forschung und Lehre. Eine historisch-kritische Studie.* By Dr. Phil. S. Tschulok, Zürich. Pp. x+409. (Jena: Gustav Fischer, 1910.) Price 9 marks.

THE author discusses at great length some of the attempts that have been made to define the scope of biology, and to indicate the logical sub-divisions of the science. Starting with early workers like Ray,